CURRICULUM VITAE
ARNE NIELSEN

WORK EXPERIENCE

5/00 – present Wind Engineers, INC.
Position: Project Consultant / Owner

- Certification by Risø in the use and implementation of WAsP modeling. The certification included aspects of wind resource assessments. Risø is recognized as banks engineers for wind resource assessments and project due diligence.
- Development and installation of precise and conventional anemometry packages, anemometry contributing to the largest uncertainty in wind resource assessments in non-complex terrain.
- Preparation of wind reports and wind resource assessments. Preparation of 3rd
- party wind reports including uncertainties and detailed confidence levels.
- Responsible for computer modeling of: noise, shadow-flicker, photomontage,
- wind farm visibility (ZVI) and modeling of wind variations due to terrain (WAsP) and structured array optimization.
- Responsible for power performance testing and site calibration campaigns including supervision of equipment installation, calibration, monitoring and preparation of reports.
- Development and preparation of wind resource maps showing the most energetic sites within a given boundary.
- Responsible for validation of wind modeling efforts by conducting precise short term anemometry measurement campaigns.
- Preparation of reports and briefings on power quality, utility performance standards and utility interconnection requirements. Conducted studies on wind farm power fluctuations, ramp rates and frequency variations on isolated utility systems. Evaluation of short term storage techniques, economics and controls.
- Early development of wind sites, identification of sites, installation of met. Towers and identification of long term reference wind monitoring stations.
- Preparation of bidding packages for utility RFP's.
- Development and implementation of state of the art methods for turbine siting (GPS, 3D moving map).
- Assigned by enXco to develop wind energy projects in Turkey. Spent 5 months in Izmir Turkey monitoring potential project sites. Implemented early development processes – development conditions being vastly different than European and American conditions.

10/98 – 5/00 NEG-MICON USA, INC.
Position: Project Director

- Responsible for most elements of installation, commissioning and power performance testing of approximately 550 wind turbines.
- Review of contracts and supply agreements for installation, commissioning and testing of NEG-Micon's 750 kW turbines.
- Negotiations with customers and vendors.
- Performed analyses of the progress of installation work. Developed progress reports and made recommendations for adjustments in order to close projects on time.

10/95 - 10/98 SAME MARINE SYSTEMS, INC.
Position: Project Consultant / Owner

- Preparation of documentation for park and turbine efficiencies in wind parks using state of the art software (WindPRO). Recommendations and consulting during project development phase in cooperation with meteorologists.
- Preparation of documentation for noise and shadow-flicker impacts from wind parks using state of the art software (WindPRO). Recommendations and consulting during project development and permitting process.
- Project management and responsible for noise reduction of current line of wind turbines at Zond Energy Systems, Inc., including in depth scrutinization of design of blades, gearboxes, generators, brake systems, yaw motors and yaw gears, towers and yaw decks, hydraulic motors and pumps.
- Preparation of spreadsheets for data treatment and graphing of results of the sound tests. Preparation of engineering memo's and reports according to current international sound standards.
- Made strain gauge, oil temperature, oil pressure measurements and power curve measurements on Vestas, Danwin, NedWind, Advanced Energy Corporation wind turbines using equipment and software especially developed for use on wind turbines. This equipment and software has been developed over the years on an as needed basis for the harsh environmental conditions in the desert.
- Prepared reports on measurements made including charting, data analysis and calibration of equipment.
- Designed and installed oil cooling units Bonus turbines.
- Development of improvements for Apollo Energy Corporation's wind turbine power plant on Hawaii including high voltage power collection system, substation, wind turbines and communication system.
- Responsible for ongoing supervision of service crews on Apollo Energy Corporation's site on Hawaii. Frequent site visits are made where updates, retrofits and improved procedures are implemented.

10/94 - 10/95 VESTAS AMERICAN WIND TECHNOLOGY, INC.
Position: Project Manager

- Responsible for preparation of turn-key quotes for wind power plants. Quotes included wind turbines, towers, foundations, central monitoring system, transformers, transmission lines, sub-stations and other high and low voltage power collection system as well as other infrastructure.
- Participated in due diligence studies on wind parks. Re-design and evaluation of wind power plant layouts. Scrutinization of especially re-powering projects for possible increase of overall plant efficiencies.
- Responsible for wind turbine micro siting including terrain influences, array loss calculations, transmission line loss estimates, etc.
- Coordination and information exchange between potential finance sources and developers / wind plant owners.
- Located and worked with suppliers and construction companies for wind plant installations. Negotiated pricing, terms, bonds etc.
- Project development and pricing of numerous wind plants, wind / pumped hydro storage systems and power regulation / management systems.
- Development of detailed spreadsheet for quotation purposes.
- Worked on market development on an ongoing basis with Vestas' agents and representatives i.e. by attending trade shows and company visits. Developed working relationships with potential agents and customers in the US, Canada and Mexico.
- Acquiring wind data and other environmental data for production verification and estimation purposes and for data base purpose.
- Explored power quality delivered from various wind turbine types. Introduced power quality measurement scheme usable for wind plants and complying with IEEE519 recommendations.
- Performed power quality measurements on wind turbines using state of the art measurement equipment. Reporting of results and comparisons of various production scenarios.
- Project development with CFE (Comision Federal de Electricidad) in Mexico, based on exchange of information, coarse pricing and detailed discussion of wind power plant type and layouts. Different options in construction principles and methods were treated in detail.
- Investigations for optimizing the high voltage collection system, lightning protection and transformer configurations for a proposed 27 MW wind power plant in La Venta, Mexico.
- Follow-up on existing wind park installation in La Venta, Mexico. Responding to and assisting New World Power and New World Entec in performing trouble finding, repair and O&M.
- Performed parallel power curve measurements for production verification purposes. Data treatment and brief reporting of results.
- Collection and formatting of wind data from weather stations and data processing and reporting of collected wind data using Microsoft Access.

1992 - 10/94 SAME MARINE SYSTEMS, INC.
Position: Project Consultant / Owner

- Project manager on various test and measurement projects. Mainly for wind turbine production increase and load determination purpose. Coordination with and reporting to domestic and foreign organizations and companies involved in the test projects, i.e. Apollo Energy Corporation, Dutch Energy Corporation, Dutch Pacific Partners, NedWind, Det Norske Veritas, Risø, SeaWest, BTM Consult Corp., Enerpro, Windgineering (Danwin), Danish Energy Agency, LM Glasfiber, HPA Trading, Dansk Vindteknik.
- Representative in US for Mita Teknik, Denmark. The largest manufacturer of wind turbine microprocessor controllers and a major manufacturer of electronic control & communication equipment.
- Development and installation of lightning and over voltage protection systems, electronic control equipment and microprocessor software for wind turbines.
- Installation of wind turbine monitoring equipment and wind farm management systems. Coordination between software developers.
- Development, purchase, installation and monitoring of state of the art test and data acquisition equipment including systems for i.e.:
  - Advanced anemometry.
  - Precise power production measurements.
  - Precise load and vibration measurements.
- Data treatment, analysis and preparation of test reports including i.e.:
  - Wind potential analysis and documentation.
  - Power curve comparisons and documentation.
  - Lifetime fatigue load spectra and fatigue load comparisons.
  - Determination on PSD and sources.
  - Documentation of test equipment accuracy and calibration.
- Engineering and consulting for various companies, i.e. Apollo Energy Corporation, Dutch Energy Corporation, Vestas, NedWind, Dutch Pacific Partners, SecondWind, SeaWest, Difko, BTM Consult Corp., Enerpro, Field Service & Maintenance, Whitewater Service Corporation, Mita Teknik, Thorsted Maskiner and HPA Trading on an ongoing basis.
- Development and implementation of US manufactured components into various Danish wind turbines.
- Measurements and recommendations for optimizing operational characteristics of various electrical and mechanical components in wind turbines.
- Recommendations for optimizing wind turbine rotor performance.
- Development of software for PC based measurements on wind turbines. Mainly for production verification, enhancement and optimization purposes.
- Custom fit / re-design of comprehensive science, engineering and graphic computer programs (Turbo Pascal) for data acquisition, analyzing and reporting purpose.

- Re-developing of procedures and software for determination of wind potentials at remote sites where little long-term anemometry has been recorded.
- Development and implementation of ISO 9000 series Quality Control procedures at organization level.

1988 - 1992 BONUS WIND TURBINES, INC. / TURBINE MAINTENANCE CORPORATION, BOTH US DIVISIONS OF BONUS ENERGY, BRANDE, DENMARK.
Position: Retrofit Engineer

- Development and dimensioning of retrofit kits for existing wind turbines with Bonus Energy, Denmark.
- Responsible for the testing and optimization of the wind turbine retrofit kits.
- Assistance in the estimation of minor repairs on large wind farms.
- Start-up and monitoring of an extensive retrofit program consisting of 550 108 kW wind turbines owned by Difko Administration, including i.e. setup of shop facilities, cranes and equipment, supervision and some hiring.
- Coordination and development of special equipment with local subcontractors for the production line and installation process at the wind farm.
- Responsible for the development, re-design and implementation of wind turbine controller hardware and software with Mita Teknik, Denmark.
- Assisting in the implementation of a practical functional quality assurance system (ISO 9000, Norske Veritas) for the retrofit program.
- Optimization and follow-up on the dimensioning of the retrofit kits by making comprehensive strain gage measurements, data treatment and reports.
- Development of user friendly wind turbine controller operation features with Mita Teknik, Denmark.
- Writing and implementing functional Service, Operation and Maintenance manuals including complete electrical and hydraulic schematics and trouble finding procedures.
- Re-design of PC science, engineering and graphic computer programs for data acquisition, analyzing and reporting purpose.

1985- 1988: Danish Wind Power A/S Kauslunde, Denmark.
POSITION: R&D Engineer

- Responsible for the design and upgrade of a 65 kW wind turbine to a 110 kW.
- Re-design and dimensioning of tower, yaw system, rotor, hydraulic brake system and canopy with subcontractors (Lindenau Verft, Germany. Dannebrog Værft, Denmark. Parker Hydraulics, Denmark).
- Assistance in the re-design of the gearbox at Kumera OY's plant in Finland.
- Responsible for the preparation of all dimensioning documentation including strain gage measurements on the prototype turbine.
- Test and implementation of the hydraulic brake system with Sabroe Værft, Denmark and Parker Hydraulics, Denmark.

- Preparation of all structural documentation and obtained approvals from Risø, the Danish test and approval facility for wind turbines.
- Specification of controller functions and operation features and implementation of a state of the art controller design from KK-Electronic, Denmark.
- Follow-up on quality control at various subcontractors in Denmark, Germany, Portugal and Finland.
- Supervision and hands on experience during the installation and commissioning of 50 110 kW turbines in Tehachapi, Ca.
- Follow-up on component malfunctions and repairs. Development and implementation of procedures for replacements and repairs.
- Total responsible for the development, design and dimensioning of new integrated 150 kW turbine. Subcontractors were i.e. Dorstener Maschinenfabrik, Germany, LM Glasfiber, Denmark. Sabroe Værft, Denmark. Efacec, Portugal. Parker Hydraulics, Denmark. KK-Electronic, Denmark.
- Responsible for the preparation of all the documentation and testing necessary to meet construction codes, sales information and safety requirements from Arbejds Tilsynet, Denmark - the Danish safety approval facility.
- Obtained approval from Risø, the turbine being the largest commercial manufactured wind turbine at that time.
- Writing and implementing an Operation, Service and Maintenance manual.
- Introduced the 150 kW turbine to the Indian market. The Indian partners were ABB (Asea Brown Bovery) Baroda, Delhi, Madras, Bombay.
- Supervision during installation and commissioning of a pilot wind turbine at DCW Chemicals, a remote site near Tutticorin, Tamil Nadu, India without any kind of modern equipment.
- Development of a reliable short-term wind potential measurement program, utilized at several Indian Government owned Meteorological Stations, parallel with different remote locations in India.
- Negotiation and initialization of know-how transfer to the Indian partners.
- Preparation and design of a 22.5 MW wind turbine power plant in India, including micro siting and dimensioning of the electrical systems.
- Education and training of Indian engineers and technicians, including the writing of all educational pamphlets.
- Total responsible for development, design and dimensioning of a 65 kW integrated wind turbine for the German market. Obtained approval from Germanischer Lloyd.
- Installed, commissioned and followed up on the 65 kW prototype in Germany.

EDUCATION

1978 - 1985: Odense Teknikum

Engineering degree and agricultural degree.

Bachelor Degree in Mechanical Engineering. Specialty achievements in electrical controls and regulation.